Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims:

Claim 1 (Original). A light source to provide illumination for a scene for a backscatter absorption gas imaging system comprising:

a light-generating device producing light at more than one wavelength;

an optical fiber amplifier having at least one pump laser with an output and a gain medium, where each of said at least one pump laser is an air-cooled pump laser having an operating temperature at an ambient temperature, where said optical fiber amplifier accepts light from said light generating device and produces amplified light at said more than one wavelength, and where the absorption of the output of said pump laser by said gain medium varies by no more than about 10% over a range of ambient temperatures of from about 0 C to about 40 C; and

a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength.

Claim 2 (Original). The light source of claim 1, wherein said light-generating device produces continuous-wave light.

Claim 3 (Original). The light source of claim 1, wherein said light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Claim 4 (Original). The light source of claim 1, wherein said light-generating device is a multi-longitudinal-mode laser.

Claim 5 (Original). The light source of claim 4, wherein said laser is a Nd:YAG laser.

Claim 6 (Original). The light source of claim 1, wherein said light-generating device is laser diode.

Claim 7 (Original). The light source of claim 1, wherein said light-generating device is fiber diode.

Claim 8 (Original). The light source of claim 1, wherein said light-generating device includes two or more light-generating devices; and further including a switch to select light from one of said two or more light-generating devices for acceptance by said optical fiber amplifier.

Claim 9 (Original). The light source of claim 1, wherein said light-generating device produces wavelength tunable light.

Claim 10 (Original). The light source of claim 9, wherein said wavelength tunable light is tunable between two wavelengths.

Claim 11 (Original). The light source of claim 1, wherein said optical fiber amplifier is a Yb-doped, tapered fiber amplifier.

Claim 12 (Original). The light source of claim 11, wherein said pump laser wavelength is near 915 nm.

Claim 13 (Original). The light source of claim 1, wherein said OPO has a cavity that tunably adjusts said wavelength output.

Claim 14 (Original). The light source of claim 1, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Claim 15 (Original). The light source of claim 1, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Claim 16 (Original). The light source of claim 1, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide

said idler beam as said adjustable wavelength output.

Claim 17 (Canceled).

Claim 18 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device produces continuous-wave light.

Claim 19 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Claim 20 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device is a multi-longitudinal-mode laser.

Claim 21 (Original). The light source of claim 20, wherein said laser is a Nd:YAG laser.

Claim 22 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device is a laser diode.

Claim 23 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device is a fiber diode.

Claim 24 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device includes two or more light-generating devices; and further including a switch to select light from one of said two or more light-generating devices for acceptance by said optical fiber amplifier.

Claim 25 (Currently amended). The light source of claim ~~17~~ 32, wherein said light-generating device produces wavelength tunable light.

Claim 26 (Original). The light source of claim 25, wherein said wavelength tunable light is tunable between two wavelengths.

Claim 27 (Currently amended). The light source of claim ~~17~~ 32, wherein said optical fiber amplifier includes at least one pump laser with an output of near 915 nm.

Claim 28 (Currently amended). The light source of claim ~~17~~ 32, wherein said OPO has a cavity that tunably adjusts said wavelength output.

Claim 29 (Currently amended). The light source of claim ~~17~~ 32, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Claim 30 (Currently amended). The light source of claim ~~17~~ 32, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Claim 31 (Currently amended). The light source of claim ~~17~~ 32, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Claim 32 (Currently amended). ~~The light source of claim 17,~~ A light source to provide illumination for a scene for a backscatter absorption gas imaging system comprising:

a light-generating device producing light at more than one wavelength;

an optical fiber amplifier to accept light from said light-generating device and produce amplified light at said more than one wavelength, wherein said optical fiber amplifier is a Yb-doped, tapered optical fiber amplifier, wherein said optical fiber amplifier includes at least one pump laser and a gain medium, and wherein each of said at least one pump laser is an air-cooled pump laser having an operating temperature at an ambient temperature; and

a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength.

Claim 33 (Original). The light source of claim 32, wherein said air-cooled pump laser has an

operating temperature at an ambient temperature, and wherein the absorption of the output of said pump laser by said gain medium varies by no more than about 10% over a range of said ambient temperatures of from about 0 C to about 40 C.

Claim 34 (Original). A light source to provide illumination for a scene for a backscatter absorption gas imaging system comprising:

two or more light-generating devices each producing light at more than one wavelength;

a switch to select light from one of said two or more light-generating devices;

an optical fiber amplifier to accept said selected light and produce amplified light at the more than one wavelength of said selected light; and

an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength.

Claim 35 (Original). The light source of claim 34, wherein said light-generating device produces continuous-wave light.

Claim 36 (Original). The light source of claim 34, wherein said light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Claim 37 (Original). The light source of claim 34, wherein at least one of said two or more light-generating devices is a multi-mode laser.

Claim 38 (Original). The light source of claim 37 , wherein said laser is a Nd:YAG laser.

Claim 39 (Original). The light source of claim 34, wherein at least one of said two or more light-generating devices is a laser diode.

Claim 40 (Original). The light source of claim 34, wherein at least one of said two or more light-generating devices produces tunable light.

Claim 41 (Original). The light source of claim 34, wherein said optical fiber amplifier is a Yb-doped, tapered fiber amplifier.

Claim 42 (Original). The light source of claim 34, wherein said optical fiber amplifier includes at least one pump laser with an output of near 915 nm.

Claim 43 (Original). The light source of claim 34, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Claim 44 (Original). The light source of claim 34, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Claim 45 (Original). The light source of claim 34, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Claim 46 (Original). A light source to provide illumination for a scene for a backscatter absorption gas imaging system comprising:

a diode-pumped fiber laser producing an output of light at more than one wavelength, where said diode-pumped fiber laser is an air-cooled laser having an operating temperature at an ambient temperature, and where said output varies with temperature; and

a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said output and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength;

where said diode-pumped fiber laser is sufficiently air-cooled to provide an output that varies by no more than 10% over an ambient temperature range of from about 0 C to about 40 C.

Claim 47 (Original). A backscatter absorption gas imaging system operating at an ambient

temperature for imaging a gas between the system and a scene, comprising:

a light source to generate an output for illuminating said scene, including

a light-generating device producing light at more than one wavelength,

an optical fiber amplifier having at least one pump laser with an output and a gain medium, where each of said at least one pump laser is an air-cooled pump laser having an operating temperature at said ambient temperature, where said optical fiber amplifier accepts light from said light generating device and produces amplified light at said more than one wavelength, and where the absorption of the output of said pump laser by said gain medium varies by no more than about 10% over an ambient temperature range of from about 0 C to about 40 C; and

a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength; and

a camera responsive to backscattered illumination by said light source.

Claim 48 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device produces continuous-wave light.

Claim 49 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Claim 50 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device is a multi-longitudinal-mode laser.

Claim 51 (Original). The backscatter absorption gas imaging system 50, wherein said laser is a Nd:YAG laser.

Claim 52 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device is laser diode.

Claim 53 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device is fiber diode.

Claim 54 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device includes two or more light-generating devices; and

further including a switch to select light from one of said two or more light-generating devices for acceptance by said optical fiber amplifier.

Claim 55 (Original). The backscatter absorption gas imaging system of claim 47, wherein said light-generating device produces wavelength tunable light.

Claim 56 (Original). The backscatter absorption gas imaging system of claim 55, wherein said wavelength tunable light is tunable between two wavelengths.

Claim 57 (Original). The backscatter absorption gas imaging system of claim 47, wherein said optical fiber amplifier is a Yb-doped, tapered fiber amplifier.

Claim 58 (Original). The backscatter absorption gas imaging system of claim 57, wherein said pump laser wavelength is near 915 nm.

Claim 59 (Original). The backscatter absorption gas imaging system of claim 47, wherein said OPO has a cavity that tunably adjusts said wavelength output.

Claim 60 (Original). The backscatter absorption gas imaging system of claim 47, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Claim 61 (Original). The backscatter absorption gas imaging system of claim 47, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the

wavelength of said idler beam.

Claim 62 (Original). The backscatter absorption gas imaging system of claim 47, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Claim 63 (Canceled).

Claim 64 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device produces continuous-wave light.

Claim 65 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Claim 66 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device is a multi-longitudinal-mode laser.

Claim 67 (Original). The backscatter absorption gas imaging system of claim 66, wherein said laser is a Nd:YAG laser.

Claim 68 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device is a laser diode.

Claim 69 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device is a fiber diode.

Claim 70 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device includes two or more light-generating devices; and further including a switch to select light from one of said two or more light-generating devices for acceptance by said optical fiber amplifier.

Claim 71 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said light-generating device produces wavelength tunable light.

Claim 72 (Original). The backscatter absorption gas imaging system of claim 71, wherein said

wavelength tunable light is tunable between two wavelengths.

Claim 73 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said optical fiber amplifier includes at least one pump laser with an output of near 915 nm.

Claim 74 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said OPO has a cavity that tunably adjusts said wavelength output.

Claim 75 (Currently amended). The light source of claim ~~63~~ 78, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Claim 76 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Claim 77 (Currently amended). The backscatter absorption gas imaging system of claim ~~63~~ 78, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Claim 78 (Currently amended). ~~The backscatter absorption gas imaging system of claim 63~~A backscatter absorption gas imaging system operating at an ambient temperature for imaging a gas between the system and a scene, comprising:

a light source to generate an output for illuminating said scene, including

a light-generating device producing light at more than one wavelength,

an optical fiber amplifier to accept light from said light-generating device and produce amplified light at said more than one wavelength, wherein said optical fiber amplifier is a Yb-doped, tapered optical fiber amplifier, wherein said optical fiber amplifier includes at least one pump laser, and wherein each of said at least one pump laser is an air-cooled pump laser, and

a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength; and

a camera responsive to backscattered illumination by said light source.

Claim 79 (Original). The backscatter absorption gas imaging system of claim 78, wherein said air-cooled pump laser has an operating temperature at an ambient temperature, and wherein the absorption of the output of said pump laser by said gain medium varies by no more than about 10% over an ambient temperature range of from about 0 C to about 40 C.

Claim 80 (Original). A backscatter absorption gas imaging system for imaging a gas between the system and a scene, comprising:

a light source to generate an output for illuminating said scene, including

two or more light-generating devices each producing continuous-wave light at more than one wavelength;

a switch to select light from one of said two or more light-generating devices;

an optical fiber amplifier to accept said selected light and produce amplified light at the more than one wavelength of said selected light; and

an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength; and

a camera responsive to backscattered illumination by said light source.

Claim 81 (Original). The backscatter absorption gas imaging system of claim 80, wherein said light-generating device produces continuous-wave light.

Claim 82 (Original). The light source of claim 80, wherein said light-generating device

produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Claim 83 (Original). The light source of claim 80, wherein at least one of said two or more light-generating devices is a multi-mode laser.

Claim 84 (Original). The light source of claim 83, wherein said laser is a Nd:YAG laser.

Claim 85 (Original). The light source of claim 80, wherein at least one of said two or more light-generating devices is a laser diode.

Claim 86 (Original). The light source of claim 80, wherein at least one of said two or more light-generating devices produces tunable light.

Claim 87 (Original). The light source of claim 80, wherein said optical fiber amplifier is a Yb-doped, tapered fiber amplifier.

Claim 88 (Original). The light source of claim 80, wherein said optical fiber amplifier includes at least one pump laser with an output of near 915 nm.

Claim 89 (Original). The light source of claim 80, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Claim 90 (Original). The light source of claim 80, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Claim 91 (Original). The light source of claim 80, wherein said OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Claim 92 (Original). A backscatter absorption gas imaging system for imaging a gas between the system and a scene, comprising:

a light source to provide illumination for a scene for a backscatter absorption gas

imaging system comprising

a diode-pumped fiber laser producing an output of light at more than one wavelength, where said diode-pumped fiber laser is an air-cooled laser, and where said output varies with temperature, and

a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said output and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength; and

a camera responsive to backscattered illumination by said light source.

where said diode-pumped fiber laser is sufficiently air-cooled to provide an output that varies by no more than 10% over an ambient temperature range of from about 0 C to about 40 C.